

Propositions

Accompanying the dissertation

“On the Preliminary Design of Aerospace-grade Compact Heat Exchangers”

From Ram Air Cooling Ducts to Energy Harvesting Systems

By

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1. The improvement of high-fidelity simulation frameworks for heat exchanger shape and topology optimization is not the key enabler for novel propulsion system designs. *This proposition pertains to this dissertation.*
2. For novel propulsion system concepts, heat transfer devices must be considered as part of a thermal management system and not as standalone components. *This proposition pertains to this dissertation.*
3. The positive return of investments in defense technology is limited to the research and development phase, while the mass production of armaments generates long-term negative effects.
4. Relying exclusively on CO₂ emissions as the indicator of the environmental impact of human activities is analogous to judging scientific progress solely by publication count.
5. The prevailing enthusiasm for AI, combined with overconfidence in perceived expertise about AI, is driving a bias in science and technology, often at the expense of deterministic methods that are superior for certain applications.
6. The absence of structured frameworks and incentives for peer-to-peer collaboration in doctoral research diminishes research innovation and leads to redundant efforts, undermining academic advancement.
7. Novel distributed energy recovery and generation technologies are insufficiently pursued and facilitated, yet they are essential drivers for boosting both technological and societal progress towards sustainability.
8. Conscience and human-like creative intelligence cannot be emergent properties of artificial neural networks (ANN) running on classical hardware, but can emerge with increased complexity in ANN running on quantum computers.

These propositions are regarded as opposable and defensible, and have been approved as such by the promotor Prof. Dr. Ir. P. Colonna and copromotor Dr. Ir. C.M. De Servi.